[illegible]

[illegible] ——[illegible]

[illegible]，[illegible]，[illegible]

$$H_2 + I_2 \rightleftharpoons 2HI$$

[illegible]：[illegible]

[illegible]

[illegible]

1mol H_2 [illegible] 1mol I_2 [illegible] 2mol HI [illegible]

思考与交流

[illegible]“[illegible]”[illegible]

(1) [illegible] H_2+O_2 [illegible]

(2) [illegible]

(3) CO_2 [illegible] H_2O [illegible] CO_2 [illegible] H_2O [illegible]

[illegible]:

$$N_2+3H_2 \rightleftharpoons 2NH_3$$ ([illegible] above the arrow / [illegible] below the arrow)

$$2SO_2+O_2 \rightleftharpoons 2SO_3$$ ([illegible] above the arrow / [illegible] below the arrow)

$$SO_2+H_2O \rightleftharpoons H_2SO_3$$

$$2NO_2 \rightleftharpoons N_2O_4$$

□□□

1. $^{14}CO_2$ □ C □□□□□□□□□□ $^{14}CO_2 + C \rightleftharpoons 2CO$ □□□

□□□□□□□□□□□□□□□□□□ ^{14}C □□□□□   □ **C**

A □ $^{14}CO_2$　　　　B □ $^{14}CO_2$ □ ^{14}CO

C □ $^{14}CO_2$ □ ^{14}CO □ ^{14}C　　　　D □ ^{14}CO

2. □□□□□□□□□□□□□ $X_2+Y_2 \rightleftharpoons 2Z$ □□□□□□

X_2 □ Y_2 □ Z □□□□□□□□□□ 0.1mol/L □ 0.3mol/L □

0.2mol/L □□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□ (　) **B**

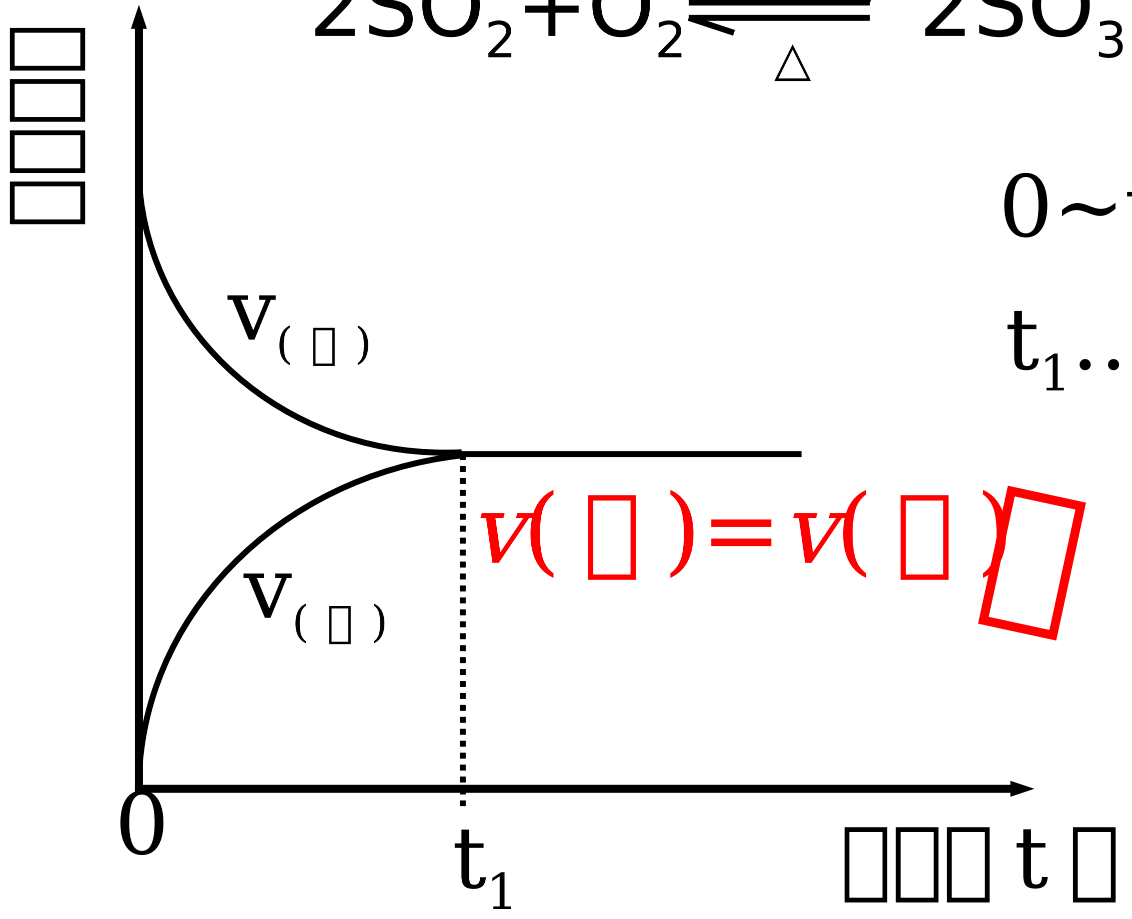
A. $c(X_2)=0.2mol/L$　　　　B. $c(Y_2)=0.35mol/L$

C. $c(Y_2)=0.2mol/L$　　　　D. $c(Z)=0.4mol/L$

[illegible]——[illegible]

1 [illegible]

$$2SO_2+O_2 \underset{\Delta}{\overset{[illegible]}{\rightleftharpoons}} 2SO_3$$



$0\sim t_1$ [illegible] $v_{(\ )} > v_{(\ )}$

$t_1\ldots$ [illegible] $v_{(\ )} = v_{(\ )}$

[illegible]

$v(\ ) = v(\ )$ [illegible]

$$2SO_2 + O_2 \underset{\triangle}{\overset{[illegible]}{\rightleftharpoons}} 2SO_3$$

[illegible]

1 [illegible] $v_{[illegible]}$ [illegible] $v(O_2)_{[illegible]}$ $v(SO_3)_{[illegible]}$

2 [illegible] $v_{[illegible]}$ [illegible] $v(O_2)_{[illegible]}$ $v(SO_3)_{[illegible]}$

3 [illegible] $v_{[illegible]} = v_{[illegible]}$

① [illegible]

② [illegible]

2 [illegible]

[illegible]: [illegible]

[illegible]

[illegible]

[illegible] $v($ [illegible] $) = v($ [illegible] $) \neq 0$ → [illegible]

[illegible]

3 [illegible]

[illegible]**:** [illegible]**——**[illegible]

[illegible] ***v*(** [illegible] **)=** ***v*(** [illegible] **)**

[illegible] ***v*(** [illegible] **)=** ***v*(** [illegible] **)** **≠0** [illegible]

[illegible]

[illegible]

[illegible]

[illegible] 1 [illegible] [illegible]　　　　A

A [illegible]

B [illegible] 0

C [illegible]

D [illegible]

[illegible]2.[illegible] M [illegible] N [illegible]
[illegible]（　　）

CD

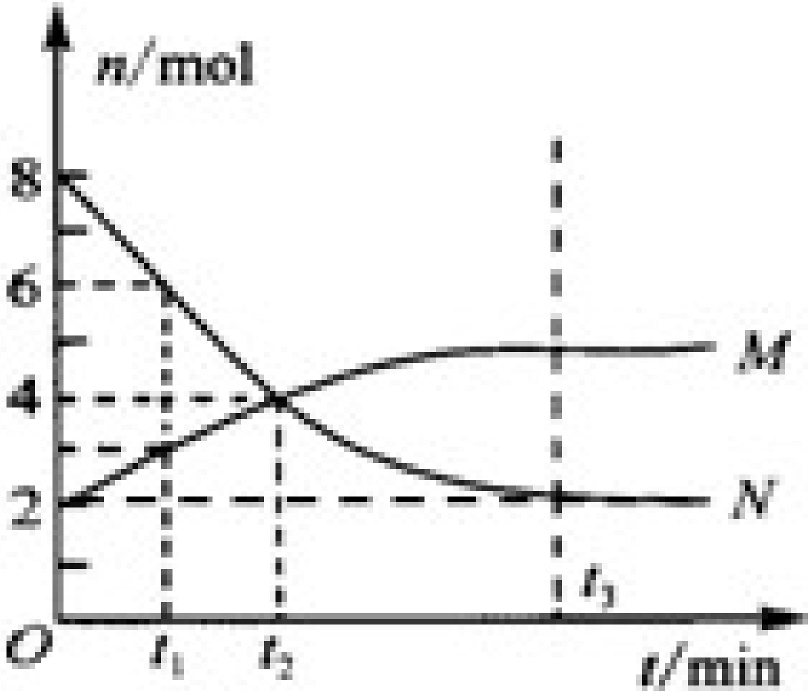
A. [illegible] $2M \rightleftharpoons N$

B．t_2 [illegible]

C．t_2 [illegible]

D．t_1 [illegible] N [illegible] M [illegible] 2 [illegible]

E. t_3 [illegible]



4 [illegible]

[illegible]1[illegible]

①“[illegible]”[illegible] v([illegible])= v([illegible]) ≠0

②“[illegible]”[illegible]

[illegible]2[illegible]

“[illegible]”

[illegible]

① [illegible]

② [illegible]

③ [illegible]

④ [illegible]

[illegible] $N_2 + 3H_2 \rightleftharpoons 2NH_3$ [illegible]

[illegible] ________ c h i k l

a. $3v(N_2) = v(H_2)$

b. $2v(N_2)_{[illegible]} = v(NH_3)_{[illegible]}$

c. $2v(N_2)_{[illegible]} = v(NH_3)_{[illegible]}$ √

d. [illegible] $3molH_2$ [illegible] $3molN_2$

e. [illegible] $3molH_2$ [illegible] $2molNH_3$

~~f. N_2 [illegible] H_2 [illegible] NH_3 [illegible]~~

~~g. N_2 [illegible] H_2 [illegible] NH_3 [illegible] 1:3:2~~ √

h. NH_3 [illegible] √

i. [illegible] √

j. [illegible]

k. [illegible] √

L. [illegible]

[illegible] 1. [illegible] A(s) +2B(g)⇌2C(g) [illegible] [illegible]

B

[illegible] 1 [illegible] v [illegible] (B) [illegible] v [illegible] (C) [illegible]

[illegible] 2 [illegible] n(B) [illegible] n(C)=1:1 [illegible]

[illegible] 3 [illegible]

[illegible] 4 [illegible]

[illegible] 5 [illegible]

A [illegible] 2 [illegible] 3 [illegible] 4 [illegible] 5 [illegible]　　B [illegible] 2 [illegible] 3 [illegible]

C [illegible] 2 [illegible] 3 [illegible] 4 [illegible]　　D [illegible] 2 [illegible] 3 [illegible] 5 [illegible]

2. [illegible] $A_2(s) + 3B_2(g) \rightleftharpoons 2AB_3(g)$ [illegible]

C

[illegible]

① [illegible]

② [illegible]

③ [illegible]

④ [illegible]

⑤ [illegible]

A ①②③　　B ①②③④

C ①②③④⑤　　D ①②③⑤

3. [illegible]

① [illegible]

② [illegible]

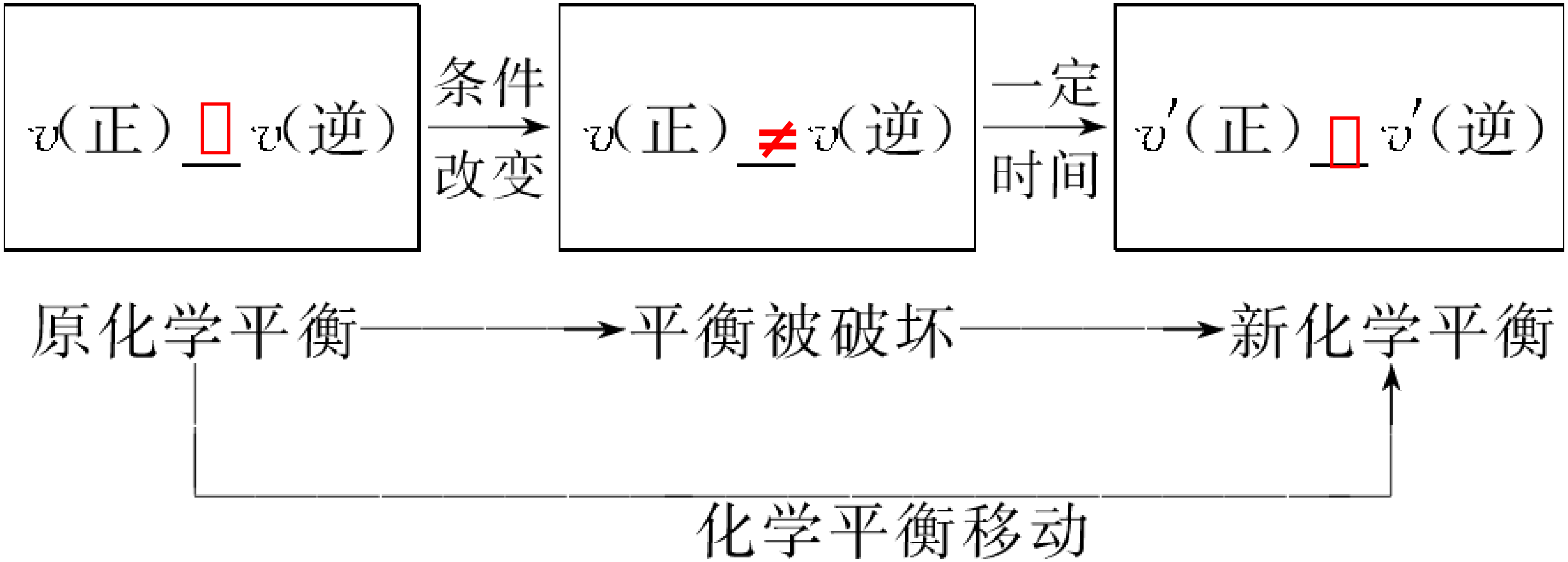
③ [illegible]

④ [illegible]

⑤ [illegible]

[illegible] $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g)$ [illegible] $CO_2(g)$ [illegible]

[illegible] ______①②③______ [illegible]



v(正) v(逆)
条件
改变
v(正) ≠ v(逆)
一定
时间
v′(正) v′(逆)
原化学平衡
平衡被破坏
新化学平衡
化学平衡移动

[illegible] υ' [illegible] υ' [illegible]

[illegible]

①[illegible] υ' [illegible] υ' [illegible]

②[illegible] υ' [illegible] υ' [illegible]

③[illegible] υ' [illegible] υ' [illegible]

[illegible] υ' [illegible] υ' [illegible]

[illegible]

[illegible]

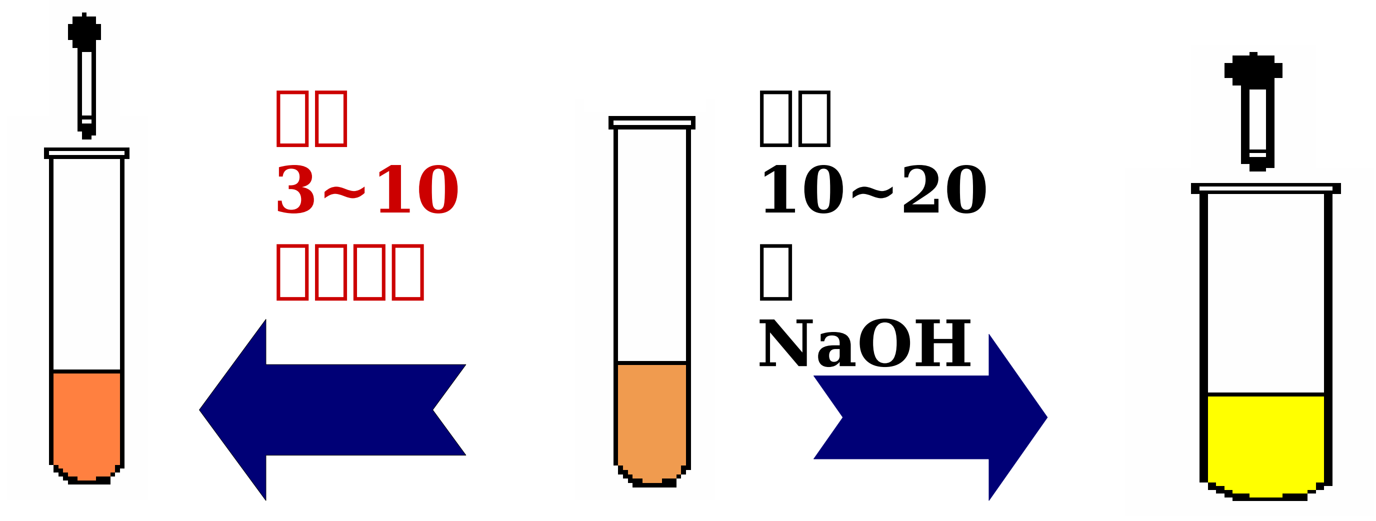
[illegible]

[illegible]

[illegible] 2-5 [illegible] $K_2Cr_2O_7$ [illegible]

$$Cr_2O_7^{2-}\text{([illegible])} + H_2O \rightleftharpoons 2\,CrO_4^{2-}\text{([illegible])} + 2H^+$$

[illegible]	1	2
[illegible]	[illegible] 5~15 [illegible]	[illegible] 5~15 [illegible] NaOH
$K_2Cr_2O_7$ [illegible]	[illegible]	[illegible]



[illegible]2-6[illegible]

$Fe^{3+}+3SCN^- \rightleftharpoons Fe(SCN)_3$ ([illegible])

[illegible]1[illegible]$FeCl_3$[illegible]——[illegible]

[illegible]2[illegible]1mol/LKSCN[illegible]——[illegible]

[illegible]1[illegible]2[illegible]NaOH[illegible]

[illegible]

1. [illegible]

[illegible]

1. [illegible]
2. [illegible]

[illegible]

3. [illegible]
4. [illegible]

[illegible]

[illegible]

[illegible]

① [illegible]

② [illegible]

[illegible]

[illegible]

[illegible]

[illegible] SO_2 [illegible]

$$2SO_2(g)+O_2(g) \rightleftharpoons 2SO_3(g)$$

[illegible] O_2 [illegible]　　[illegible] SO_3 [illegible]

[illegible]

[illegible]

[illegible]
[illegible]
[illegible].

“[illegible]”≠“[illegible]”[illegible]“[illegible]”

2. [illegible]—[illegible]

[illegible]

A [illegible]

B [illegible]

[illegible] **1** [illegible] $\mathbf{2SO_2(g)+O_2(g) \rightleftharpoons 2SO_3(g)}$

[illegible] 1. [illegible] — [illegible]

2. [illegible] — [illegible]

[illegible]

[illegible]2[illegible] $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$

[illegible]? —[illegible] [illegible]

[illegible]

[illegible]

1. [illegible]

[illegible]

2. [illegible]

[illegible]

[illegible]

[illegible]

a [illegible]

b [illegible]

[illegible] 1 [illegible]

① $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$ [illegible]

② $H_2O(g) + CO(g) \rightleftharpoons CO_2(g) + H_2(g)$ [illegible]

③ $H_2O(g) + C(s) \rightleftharpoons CO(g) + H_2(g)$ [illegible]

④ $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ [illegible]

⑤ $H_2S(g) \rightleftharpoons H_2(g) + S(s)$ [illegible]

[illegible] ② [illegible] ⑤ [illegible]

[illegible] 2 [illegible]

$$CO_2(g)+C(s) \rightleftharpoons 2CO(g)$$

[illegible]

[illegible] 1 [illegible] ____________ ; $c(CO_2)$

[illegible] ________ [illegible] [illegible]

[illegible] 2 [illegible] N_2 [illegible] ________ ;

$c(CO_2)$ [illegible] ________ [illegible] [illegible]

[illegible] 3 [illegible] N_2 [illegible] ____________ ;

$c(CO_2)$ [illegible] ______ [illegible] [illegible]

[illegible] 4 [illegible] C [illegible] ____________ [illegible] ;

$c(CO_2)$ ______ [illegible] ______ [illegible]

□□3□□□□，□□aX(g) $\rightleftharpoons$ bY(g) + cZ(g)□□□□□，□□□□□□□□□□□□□，□□□□□□X□□□□□□□□0.1mol/L□□□0.19mol/L，□□□□□□□□□ □

A. a□b+c

B. a□b+c

C. a□b+c

D. a□b=c

A

[illegible] 4:

[illegible] $2A(?)+B(g)=2C(?)$ [illegible]

[illegible]

D

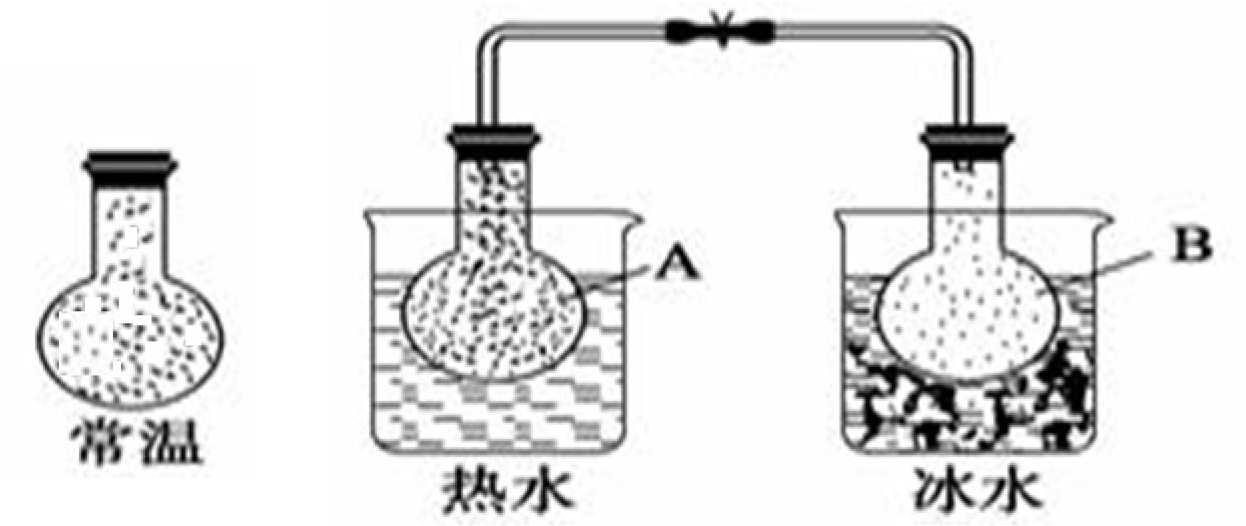
A: A [illegible] C [illegible]

B: A [illegible] C [illegible]

C: A [illegible] C [illegible]

D: A [illegible] C [illegible]

3. $2NO_2(g) \rightleftharpoons N_2O_4(g)$ △H<0



[ ]A : ①____________ NO_2

____ ② ____________________________________

B : ①____________ NO_2

______ ② ____________________________________

[[illegible]] [illegible]

A [illegible]

B [illegible]

[illegible]

[illegible] $2NO_2(g) \rightleftharpoons N_2O_4(g)$ [illegible] $\triangle H<0$ [illegible]

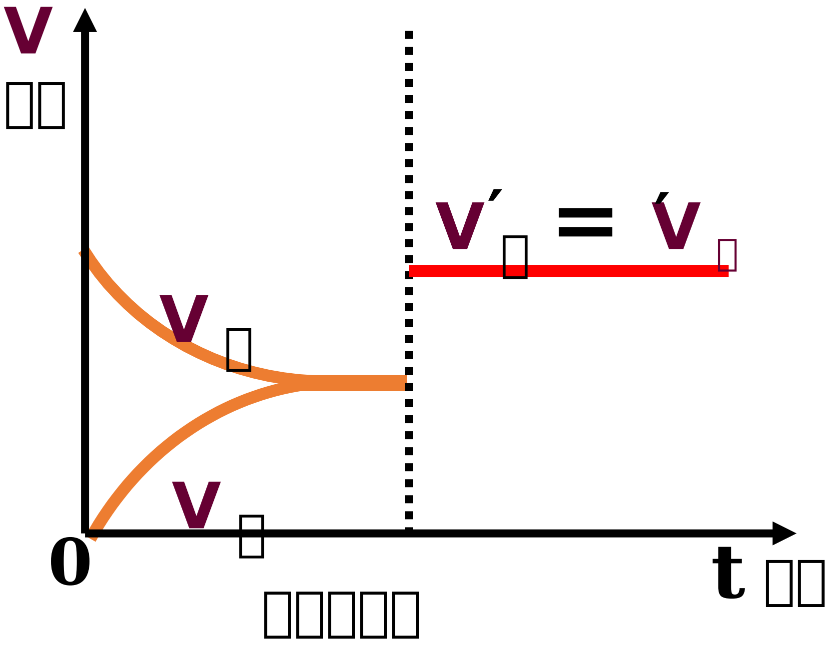
[illegible] $2HBr(g) \rightleftharpoons H_2 + Br_2(g)$ [illegible]△H >0 [illegible]（　　　）

BC

A [illegible]　B [illegible]　C [illegible]　D [illegible] H_2 [illegible]

4. [illegible]

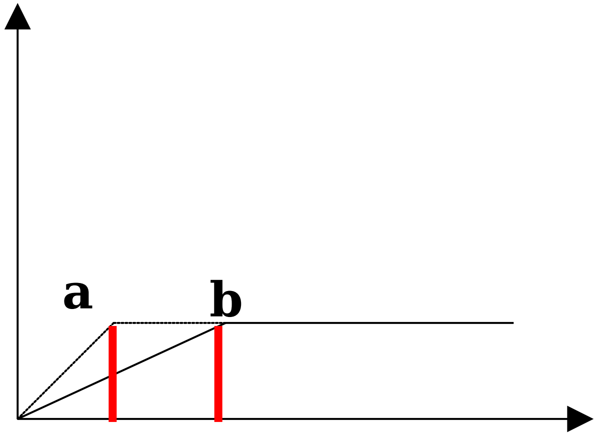
[illegible].



[illegible]

□□． □□□□ 3A(g) + B(g) ⇌ C(s) + 4D(g) △H <0

□□□ a □ b □□□□□□□ D □□□□□□□ t □□□□□□□□□□ D b □□□□ a □□□□□□□□（ ）



①

② □□ B □□□

③ □□□□□□

④ □□□□□□□□
□□□□□

A. ①② ①③B. ②③ C. ③④

D.

[[illegible]] [illegible]

[illegible]		[illegible]
①	[illegible]	[illegible]
	[illegible]	[illegible]
②	[illegible]	[illegible]
	[illegible]	[illegible]
③	[illegible]	[illegible]
	[illegible]	[illegible]
④	[illegible]	[illegible]

[illegible] 1 [illegible] [illegible] **D**

A . [illegible]

B. [illegible]

C. [illegible] NH_3 [illegible]

D. [illegible] $FeSO_4$ [illegible]

□□2

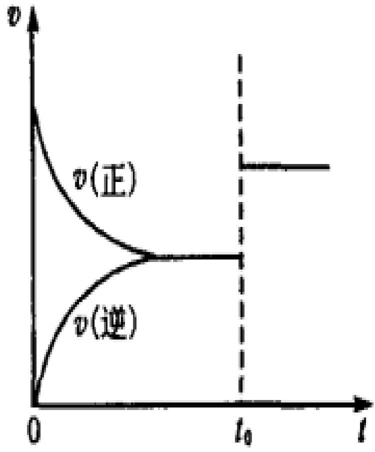
可逆反应 $aX(g)+bY(g) \rightleftharpoons cZ(g)$ 在一定温度下的一密闭容器内达到平衡后，t_0 时改变某一外界条件，化学反应速率（v）—时间（t）图象如右图。则下列说法中正确的是（　　）

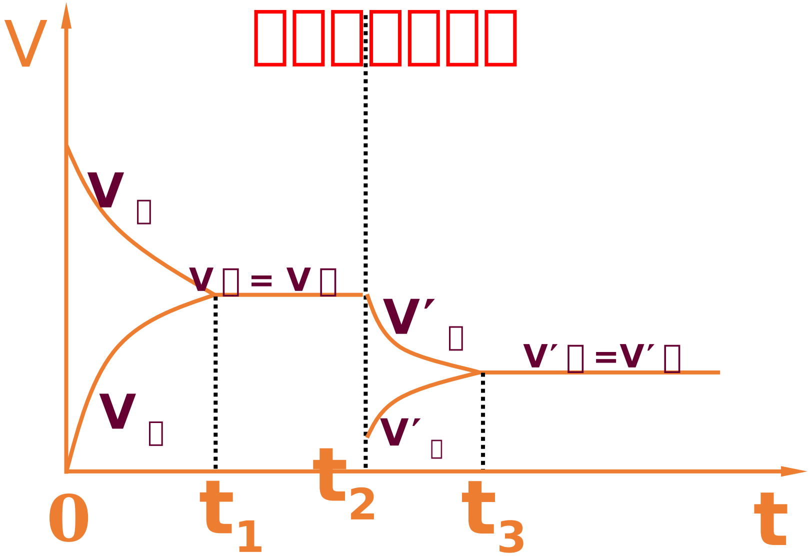
A 若 $a+b=c$，则 t_0 时只能是增大了容器的压强

B 若 $a+b=c$，则 t_0 时只能是加入了催化剂

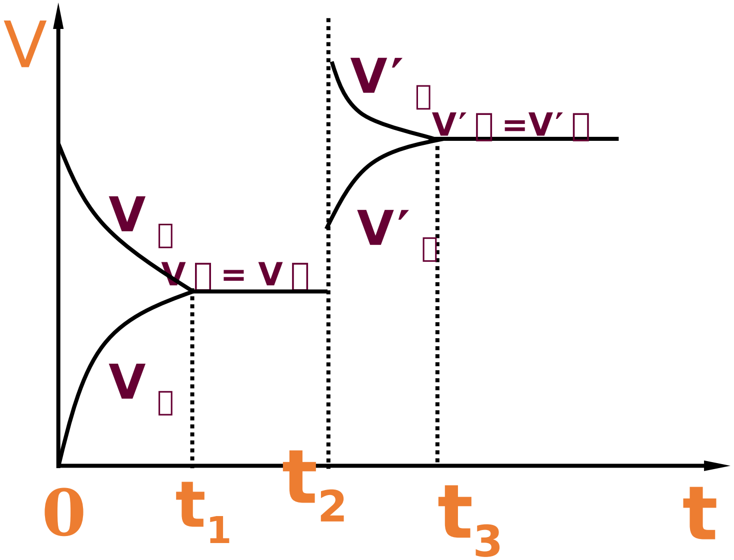
C 若 $a+b\neq c$，则 t_0 时只能是增大了容器的压强

D 若 $a+b\neq c$，则 t_0 时只能是加入了催化剂



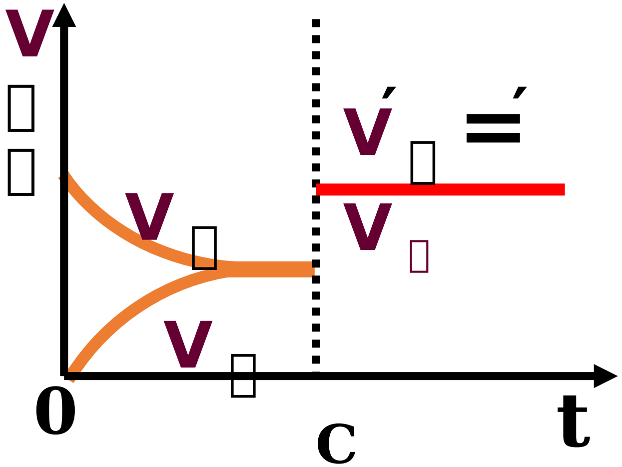


A



B

△*H<0*



C

[illegible]$N_2+3H_2 \rightleftharpoons 2NH_3$ △**H<0**

[illegible] ***v*-t** [illegible]

① [illegible] ② [illegible]

③ [illegible] ④ [illegible]

⑤ [illegible] ⑥ [illegible]

⑦ [illegible] ⑧ [illegible]

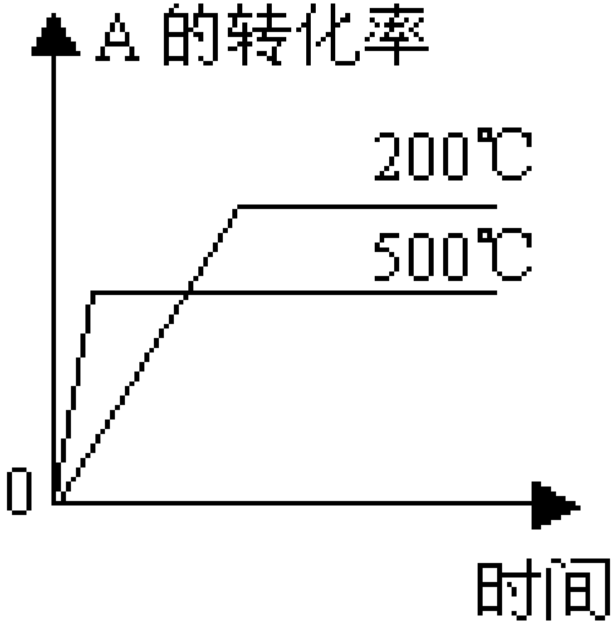
⑨ [illegible]

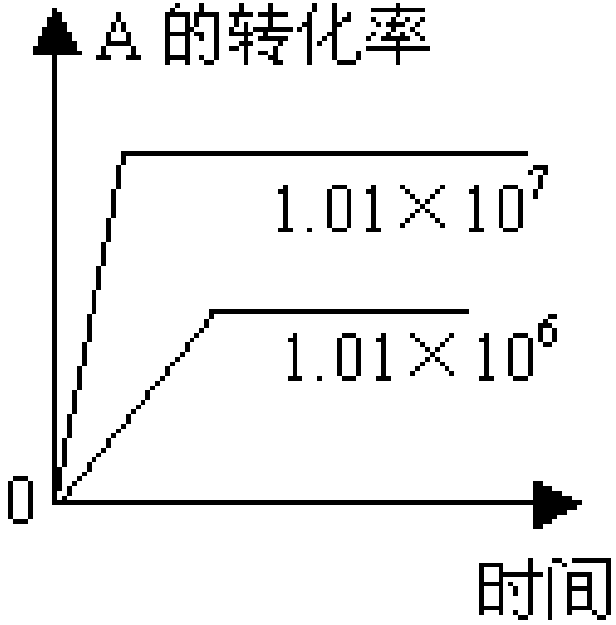
□□□□□□

□□□□□ $mA(g)+nB(g) \rightleftharpoons pC(g)+qD(g)$ □$\triangle H$

$m+n$ ___?___ $p+q$　　　$\triangle H$ ___?___ 0

1 □ □□□□□□ □□

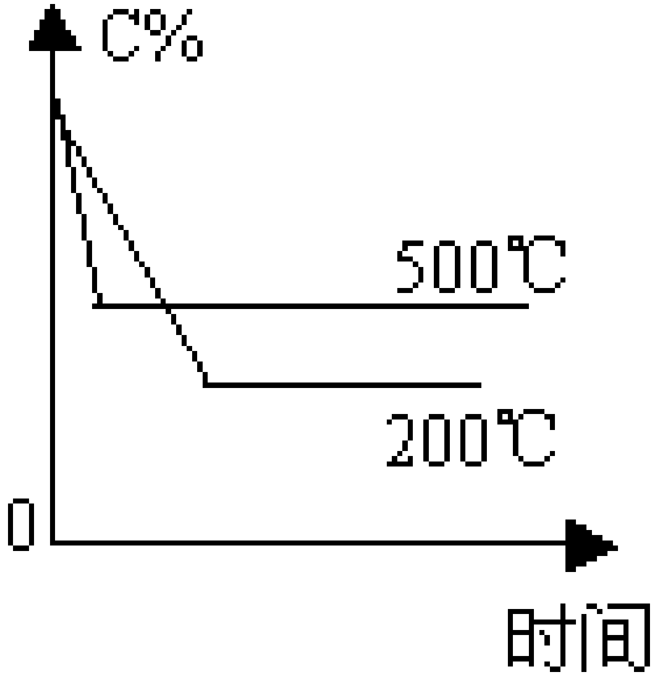


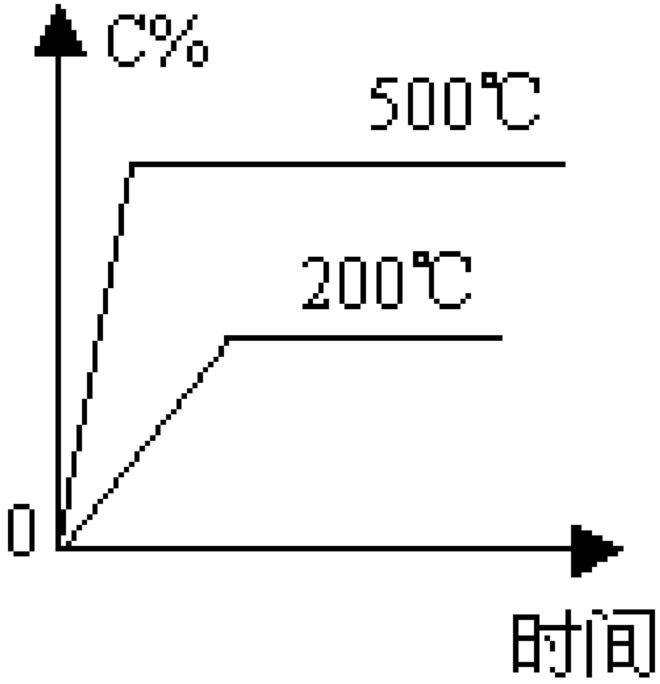


P 一定时，$\triangle H$ ___<___ 0　　　T 一定时，$m+n$ ___>___ $p+q$

mA(g)+nB(g) ⇌ pC(g)+qD(g) □△*H*

2 □□□□□ □□

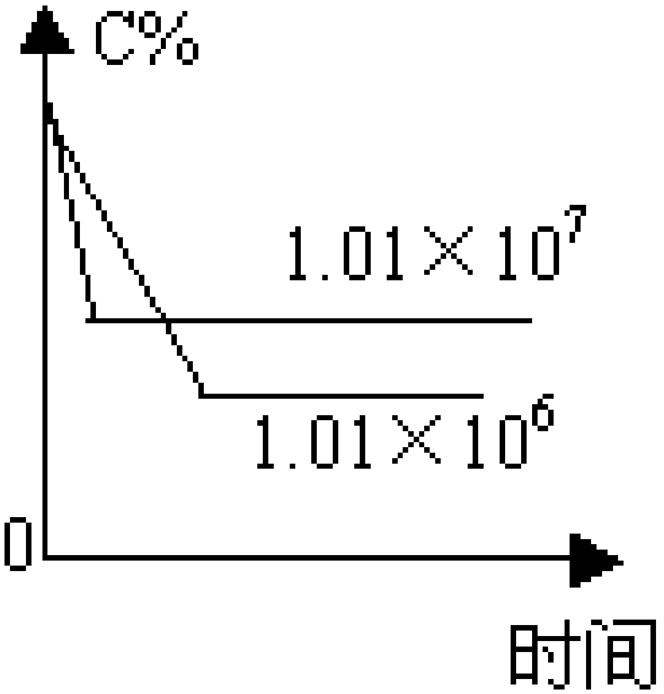


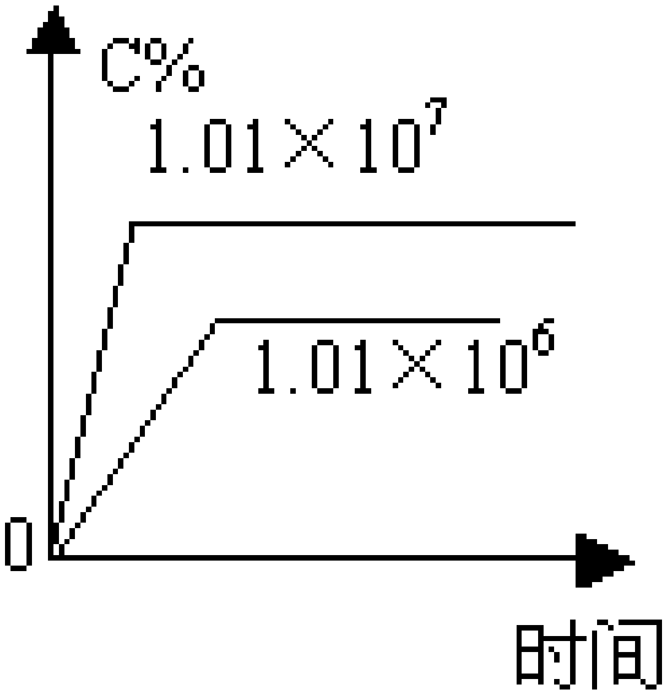


P 一定时，△***H*** __>__ **0**

P 一定时，△***H*** __>__ **0**

$mA(g)+nB(g) \rightleftharpoons pC(g)+qD(g)$ △*H*

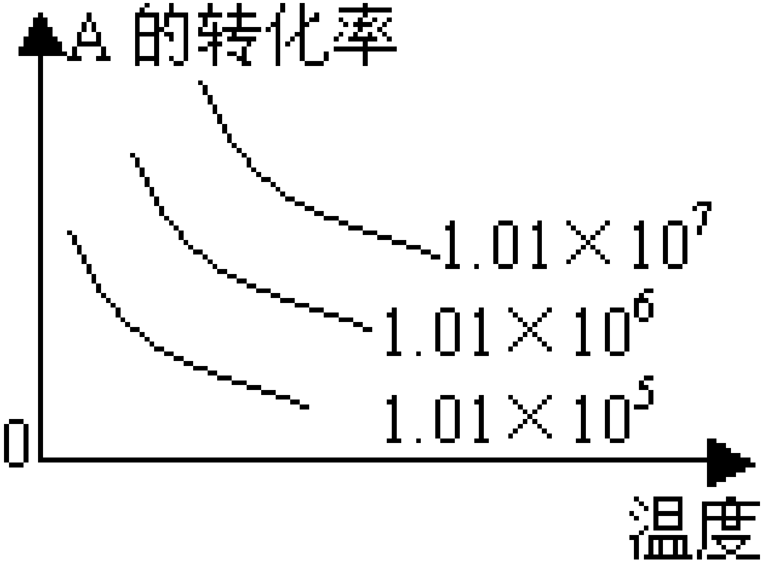




T 一定时 $m+n \underline{>} p+q$ T 一定时，$m+n \underline{\ >\ } p+q$

$mA(g)+nB(g) \rightleftharpoons pC(g)+qD(g)$ □△*H*

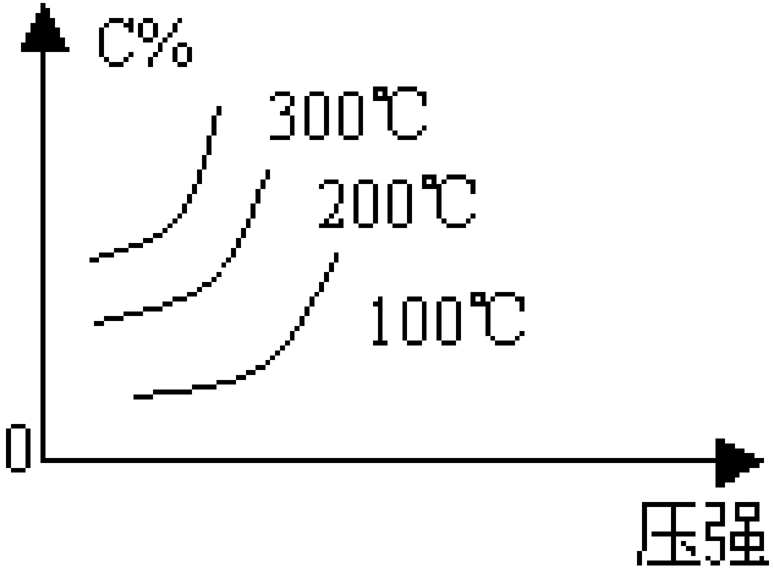
3 □□□□□□□□□ □□

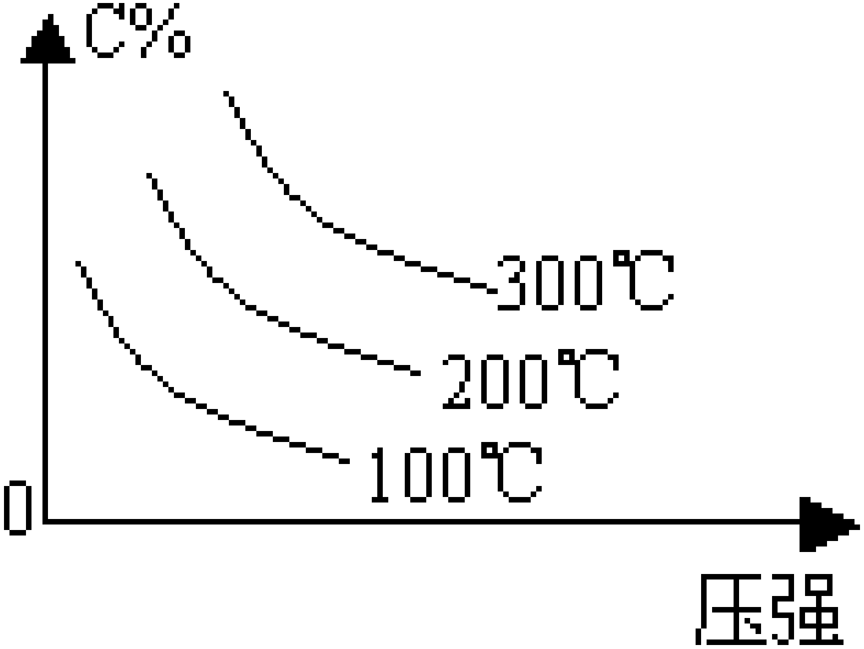


m+n_>_p+q△*H* _<_0　　**m+n_<_p+q△*H* _>_0**

mA(g)+nB(g) ⇌ pC(g)+qD(g) □△*H*

4 □□□□□□□□□ □□

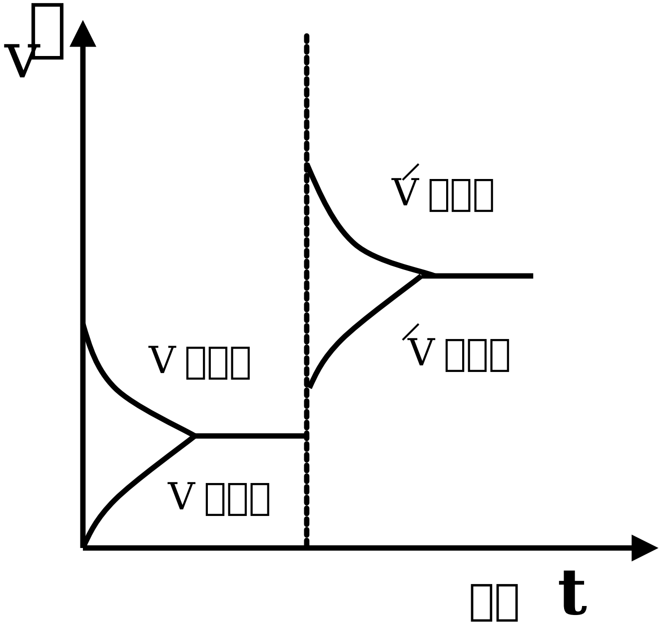




m+n _>_ p+q △*H* _>_ 0　　**m+n _<_ p+q △*H* _>_ 0**

□□□ 1

1. □□□□□□□□□□□□： **X+Y ⇌ W+Z** □□□□
□□□□□□□□□□□□□□□□
□□□□□□ **X**□**Y**□**W**□**Z**□□□
□□□ **B**（ ）



A. **Z**□**W**□□□□□**X**□**Y**□□□□□□□

B. ~~**Z**□**W**□□□□□□□□**X**□**Y**□□□□~~

C. **X**□**Y**□**Z**□□□□□□**W** □□□

D. **X**□**Y**□□□□□**Z**□**W** □□□□□

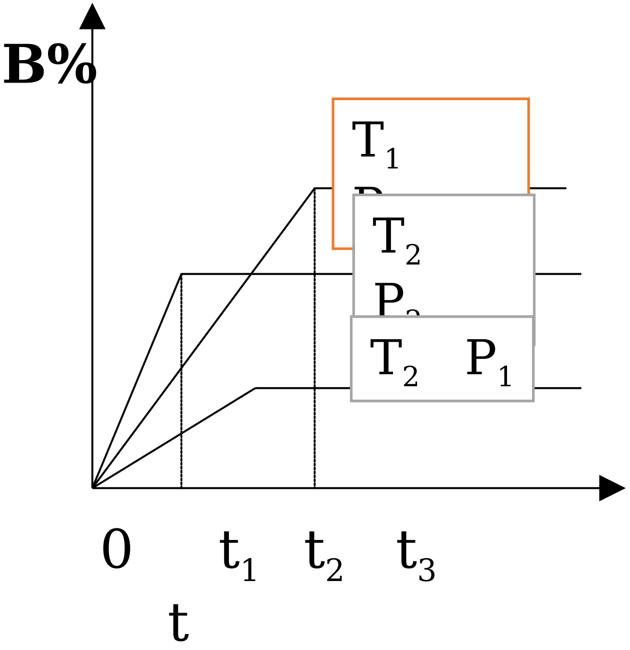
[illegible] 2

2. [illegible]

m A(g[illegible] + n B[illegible]g[illegible] ⇌ p C [illegible]g[illegible] △H

[illegible] **t** [illegible] **T** [illegible] **p** [illegible] **B** [illegible] **B%** [illegible]

[illegible] C [illegible]



A. $T_1 < T_2$ $p_1 < p_2$ $m+n < p$ $\triangle H<0$

B. $T_1 < T_2$ $p_1 > p_2$ $m+n > p$ $\triangle H>0$

C. $T_1 < T_2$ $p_1 < p_2$ $m+n < p$ $\triangle H>0$

D. $T_1 > T_2$ $p_1 < p_2$ $m+n < p$ $\triangle H<0$

3

3. m A(s) + n B(g) ⇌ p C(g)

B B%

C

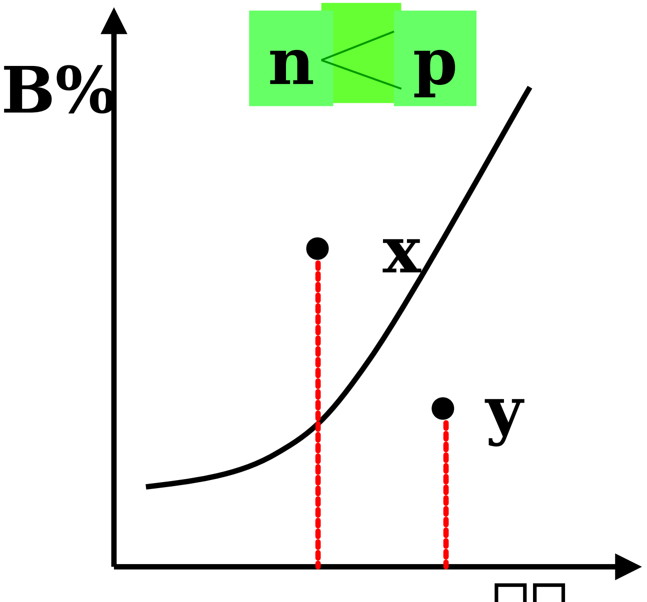
A. m + > n p

B. > n p

C. x

> v v

D. x y



[illegible]

1. [illegible] **X** [illegible] **Y** [illegible] **$mX(g) \rightleftharpoons nY(g)$ △H=QkJ/mol** [illegible] **Y** [illegible]

[illegible] **C**

A. m [illegible] **n**　　**B. ΔH** [illegible] **0**

C. [illegible] **Y** [illegible]

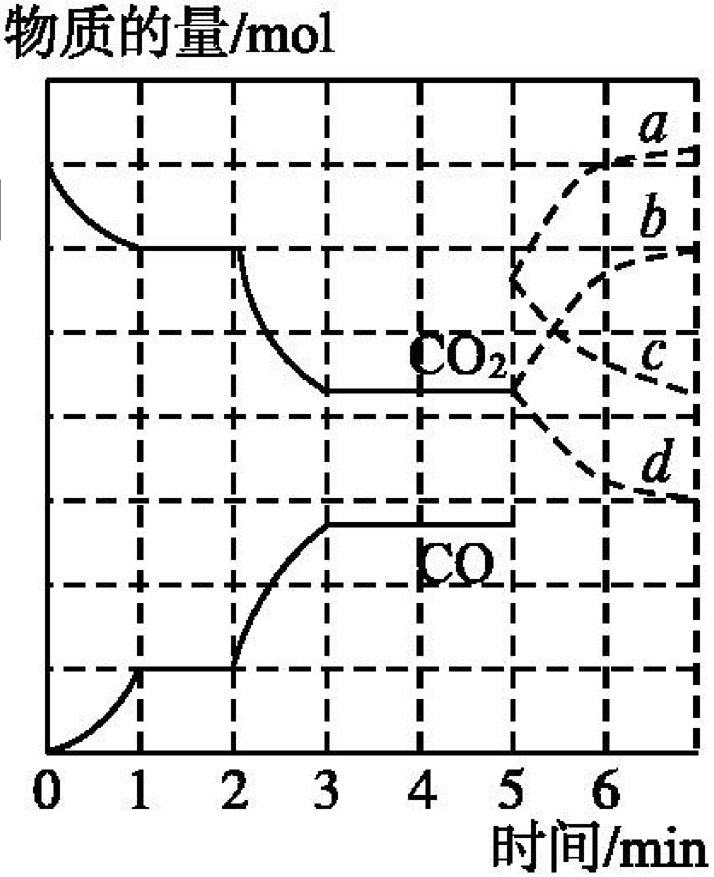
D. [illegible]

[illegible]/°C ＼ [illegible] c(Y)/mol•L^{-1} ＼ [illegible]/L	1	2	3
100	1.00	0.75	0.53
200	1.20	0.90	0.63
300	1.30	1.00	0.70

2. □□□□□□ 2 L □□□□□□□□□□□□□□□□

Fe(s)+CO_2(g)⇌FeO(s)+CO(g) □□□ CO_2 □ CO □□□

□□ (mol) □□□ (min) □□□□□□□□□□



(1) □□□ 1 min □□□□□□□□□□□□□

□□□□ 3.2 g □□ CO_2 □□□□□□□□□□□□

v(CO_2)= 0.1 mol·L^{-1}·min^{-1} □

(2) □□□□□ 2 min □□□□□□□□□□□□□

□□□□□□□□ 3 min □□□□□□□□□ ΔH_ > __0(□“ >”“<” □“ =”)

(3)5 min □□□□□□□□□ CO(g) □□□□□□□□□□□□□□□□□_____ (□□□□)　　C

A.v(□)□□□□□□　　B.v(□)□□□□□□

C.v(□)□□□□□□　　D.v(□)□□□□□□

□□ $n(CO_2)$ □□□□□□□_____ (□□□□□□□□□□□) b

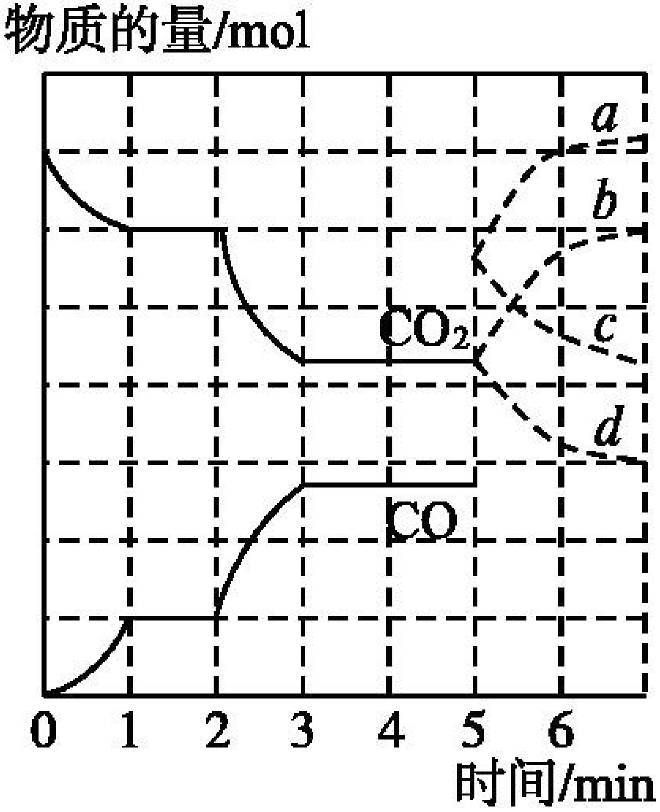
(4) □□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□

__________□

Fe(□FeO)□□□(□□□□□)□□□□□□ □

□□□□□□□□



P_{29}

[illegible] —— K

1. [illegible]

2. [illegible]

[illegible] ***a*A(g)+*b*B(g) ⇌ *c*C(g)+*d*D(g)** [illegible]

$$K=\frac{c^{c}(C)\cdot c^{d}(D)}{c^{a}(A)\cdot c^{b}(B)}$$

[illegible] ***c*** [illegible]

K_c [illegible] K_p [illegible]

3. [illegible]

[illegible]

⇨ **K** [illegible]

[illegible] **K** [illegible] **10^5** [illegible]

[illegible] **$K<10^{-5}$** [illegible]

4. [illegible]

[illegible] 1 [illegible];

[illegible] 2 [illegible]

[illegible]

[illegible] 3 [illegible]

K [illegible]

[illegible] 4 [illegible] K [illegible]

[illegible] $Cr_2O_7^{2-} + H_2O \rightleftharpoons 2CrO_4^{2-} + 2H^+$

[illegible]
$$K = \frac{c^2(CrO_4^{2-}) \cdot c^2(H^+)}{c(Cr_2O_7^{2-})}$$

[illegible]

1. $2SO_2(g) + O_2(g) \underset{}{\overset{\text{[illegible]}}{\rightleftharpoons}} 2SO_3(g)$

. $Fe_3O_4(s) + 4H_2(g) \underset{}{\overset{\text{[illegible]}}{\rightleftharpoons}} 3Fe(s) + 4H_2O(g)$

3. $FeCl_3$ ([illegible]) + 3KSCN ([illegible]) $\rightleftharpoons$ $Fe(SCN)_3$ ([illegible]) + 3KCl

[illegible] 5 [illegible]

[illegible] $N_2+3H_2 \rightleftharpoons 2NH_3$

$2NH_3 \rightleftharpoons N_2+3H_2$

$1/2N_2+3/2H_2 \rightleftharpoons NH_3$

① [illegible] ② [illegible] ① [illegible] ③ [illegible]

a. [illegible]

b. [illegible]

□□□

$NH_4I(s) \rightleftharpoons NH_3(g)+HI(g)$ K_1

$2HI(g) \rightleftharpoons I_2(g)+H_2(g)$ K_2

$2NH_4I(s) \rightleftharpoons 2NH_3(g)+I_2(g)+H_2(g)$ $K_3=?$

5. [illegible]

[illegible]1[illegible]

K[illegible]

[illegible]

[illegible]

[illegible]

[illegible]2[illegible]

[illegible]K[illegible] ______ [illegible]

[illegible]K[illegible] ______ [illegible]

[illegible] 3 [illegible]

[illegible] mA(g) + nB(g) $\rightleftharpoons$ pC(g) + qD(g) [illegible]

$$Q_c = \frac{c^p(C)\cdot c^q(D)}{c^m(A)\cdot c^n(B)}$$

(Q_c [illegible])

[illegible] Q_c [illegible] K_c [illegible] V [illegible] V [illegible]

Q_c [illegible] K_c [illegible] ([illegible]) [illegible] V [illegible] V [illegible]

Q_c [illegible] K_c [illegible] ([illegible]) [illegible] V [illegible] V [illegible]

6 [illegible]

[illegible] 1 [illegible]

[illegible] $aA+bB \rightleftharpoons cC+dD$

[illegible] A [illegible] α [illegible]

$$\alpha(A)=\frac{A\text{的初始浓度}-A\text{的平衡浓度}}{A\text{的初始浓度}}=\frac{C_0(A)-[A]}{C_0(A)}\times 100\%$$

[illegible]

([illegible])

[illegible] 2 [illegible] [illegible]

□□□□□□□□□□□□ 0.020mol/L$H_2O(g)$ □ 0.020mol/L $CO(g)$ □□□□□ 773K □□□□□□□□

$$CO(g)+H_2O(g) \rightleftharpoons CO_2(g)+H_2(g)$$

K=9 □□ CO □□□□□

□□□ CO □□□□□□ x □□□□□□□

$$CO(g)+H_2O(g) \rightleftharpoons CO_2(g)+H_2(g)$$

□□□□/(mol/L)	0.020	0.020	0	0
□□□□/(mol/L)	x	x	x	x
□□□□/(mol/L)	0.020-x	0.020-x	x	x

□□ $K=\frac{c(CO_2)\cdot c(H_2)}{c(CO)\cdot c(H_2O)}=\frac{x^2}{(0.020-x)^2}=9$

□□ x=0.015mol/L

□□□□ $a(CO)=\frac{0.015mol/L}{0.020mol/L}\times 100\%=75\%$

[illegible]

1. [illegible] [illegible] B

A. [illegible]

[illegible]

B. [illegible]

C. [illegible]

D. [illegible]

2. [illegible] 448℃ [illegible] $I_2(g)+H_2(g) \rightleftharpoons 2HI(g)$ [illegible]

49 [illegible]

[illegible] $2HI(g) \rightleftharpoons I_2(g)+H_2(g)$ [illegible] ____________;

$1/2\ I_2(g)+1/2H_2(g) \rightleftharpoons HI(g)$ [illegible] ________

3. □□□□□□□□□□□□□□□□□□□

CO_2□g□+H_2□g□⇌CO□g□+H_2O□g□□□□□□□□□K

□□□T□□□□□□□

T/℃	700	800	830	1000	1200
K	0.6	0.9	1.0	1.7	2.6

□□□□□□□

□1□□□□□□□□□□□□□□□□□K=______□ √

□2□□□□□______□□□□□“□□”□“□□”□□

□3□□ $c(CO_2)\cdot c(H_2)=c(CO)\cdot c(H_2O)$, □□□□□ 830 ℃ □______

□4□ 1200 °C □□□□□□□□ CO_2 □ H_2 □ CO □ H_2O □ □□□□□

2mol/L□2mol/L□4mol/L□4mol/L□□□□□□□□□□□□□□□

______(□□“□□□□”□“□□□□”) √

恒温下, 在 5L 的密闭容器中充入 2molX 气体和 1molY 气体发生反应：$2X(g)+Y(g) \rightleftharpoons 2Z(g)$；$\Delta H<0$ 。10min 后达平衡，测得容器内压强是反应前的 5/6，下列说法中错误的是（　）

A. 平衡时，X 的转化率为 50%

B. 该温度下平衡常数 K=10

C. 10min 内生成物 Z 的反应速率 $0.2 mol\cdot L^{-1}\cdot min^{-1}$

D. 某一时刻，X、Y、Z 的物质的量分别是 0.4mol、0.2mol、1.6mol，此刻 $V_{正}<V_{逆}$

1 □□□□□□□□□ 2L □□□□□□□ A □□□ 1mol N_2 □ 1mol H_2 □□□□□□□□□□□□□□

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ □△□□ 0 □□□

□□□□□□□□□□□□□□□□□□□□ 0.4mol □

12.5

（1 □□□□□□□□□□ K □□________□

（2 □□□□□□□□□□□□□□□ 1L □□□□□

B □□□□□□□□□ 2mol □ 1mol □ 1mol □□

N_2 □ H_2 □ NH_3 □□□，□□□□□□□□□□□

□ □

___(“□”□“□”)□□□□___□□□□□

□□

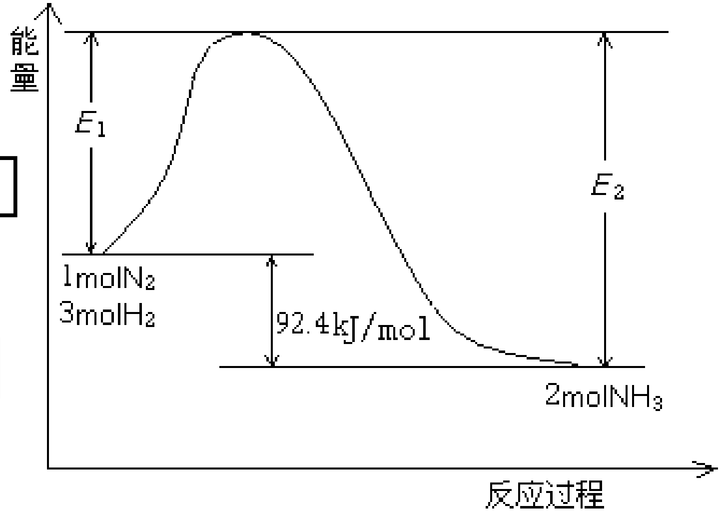
（3 □□□□ A □□□□□□□□□ K □ ________________

□□“□□”□“□□”□“□□”□

2. [illegible]

$N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g)$ $\Delta H = -92.4\ kJ/mol$

[illegible]



① [illegible] E_2 [illegible]

________[illegible]"[illegible]"[illegible]"[illegible]"[illegible]"[illegible]"[illegible]

② [illegible] $N_2(g)$ [illegible] $H_2(g)$ [illegible] 2L [illegible]

[illegible] 500°C [illegible] 2×10^7Pa [illegible]

5 [illegible] N_2 [illegible] 0.2 mol [illegible] H_2 [illegible] 0.6 mol [illegible] NH_3 [illegible]

0.2 mol [illegible] $v(N_2)$ [illegible] __**0.01mol·L[illegible]¹·min[illegible]¹**__ [illegible]

H_2 [illegible] __**33.3%**__ [illegible] ________

__**3.7 $(mol/L)^{-2}$**__ [illegible]

③ [illegible]②[illegible] H_2 [illegible] ________ [illegible] **A D**

A [illegible] B [illegible]

C [illegible] D [illegible]

3. [illegible] CO_2 [illegible]

$C(s)+CO_2(g) \rightleftharpoons 2CO(g)$ [illegible]

[illegible]

[illegible] $P_{[illegible]}$ [illegible] = [illegible] $P_{[illegible]}$ [illegible] × [illegible]

[illegible] **B**

A [illegible] 550°C [illegible] $\upsilon_{[illegible]}$ [illegible] $\upsilon_{[illegible]}$ [illegible]

B [illegible] 650°C [illegible] CO_2 [illegible] 25.0%

C [illegible] T°C [illegible] CO_2 [illegible] CO [illegible]

D [illegible] 925°C [illegible]

$K_P=24.0P_{[illegible]}$

4.(2018·[illegible]) [illegible] 1.00 L [illegible]

N_2O_4 [illegible] $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ [illegible]

[illegible]

[illegible]❄●

(1) [illegible] Δ*H* ____[illegible]____ 0 [illegible]

100 °C [illegible]

[illegible]

[illegible] K_1 [illegible] ____0.36____ [illegible]

(2)100 °C [illegible] *T* [illegible] $c(N_2O_4)$ [illegible] 0.002 0 $mol\cdot L^{-1}\cdot s^{-1}$ [illegible] 10 s [illegible]

① *T* ____[illegible]____ ([illegible] “[illegible]” [illegible] “[illegible]”)100 °C [illegible]

________[illegible]________ [illegible]

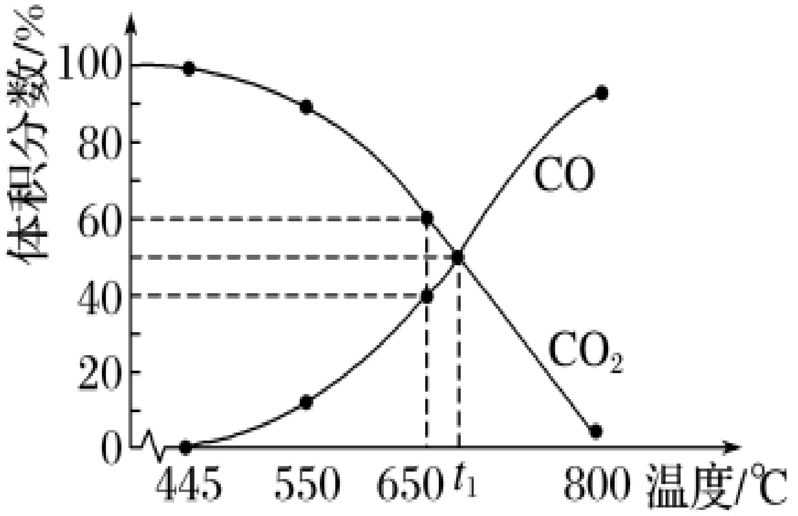
⇌

> >

B

一定量的 CO_2 与足量的 C 在恒压密闭容器中发生反应：

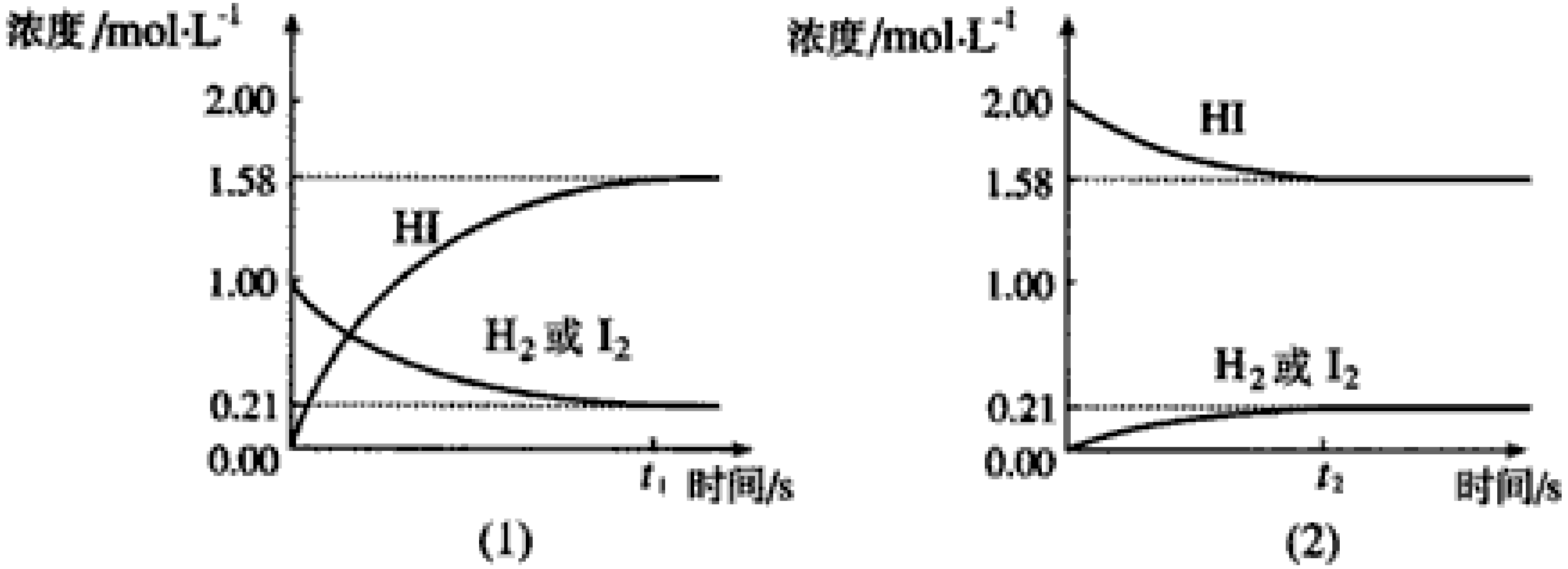
$C(s)+CO_2(g)$ $\quad$ $2CO(g)$ $\quad \Delta H=+173\ kJ\cdot mol^{-1}$，若压强为 p kPa，平衡时体系中气体体积分数与温度的关系如图所示，回答下列问题：



(1)650 ℃时 CO_2 的平衡转化率为 25% 。

（2）t_1 ℃时平衡常数 K_p = 0.5p (用平衡分压代替平衡浓度计算，分压=总压×物质的量分数)；该温度下达平衡后若再充入等物质的量的 CO 和 CO_2 气体，则平衡 不 (填“正向”“逆向”或“不”)移动，原因是 $Q_p=K_p$ 。

425°C 1 $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$



[illegible]

1. [illegible]

[illegible]

- [illegible]①[illegible] **T**[illegible] **V** [illegible] ②[illegible] **T**[illegible] **P** [illegible]

$$2H_2 + O_2 \rightleftharpoons 2H_2O$$

	$2H_2$	O_2	$2H_2O$
$n_{[illegible]1}$(mol)	2	1	2
$n_{[illegible]2}$(mol)	4	2	4

2. □□□

□1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
□□□□□□(□□□n□c□P□□□□□

□□□□□ $2SO_2\ (g) + O_2(g) \rightleftharpoons 2SO_3\ (g)$

	$2SO_2\ (g)$	$O_2(g)$	$2SO_3\ (g)$
n_{01}(mol)	2	1	0
n_{02}(mol)	0	0	?
n_{03}(mol)	1	?	?
n_{04}(mol)	a	b	c

□□4□a□b□c□□□□□□□□□□□□□□□1□□□
□□?

a+c=2

b+1/2c=1

a:b=2:1

[illegible] 2 [illegible] n [illegible] c [illegible] P [illegible]

[illegible]

$$H_2 + I_2 \rightleftharpoons 2HI$$

	H_2	I_2	$2HI$
[illegible] 1 [illegible] : n_{01}(mol)	1	2	0
[illegible] 2 [illegible] : n_{02}(mol)	2	4	0
[illegible] 3 [illegible] : n_{03}(mol)	0.25	1	?

[illegible]

H_2 + I_2 ⇌ $2HI$

[illegible] 1 [illegible]: n_{01}(mol) 1 2 0

[illegible] 2 [illegible]: n_{02}(mol) 2 4 [illegible]

[illegible] 1: 1mol H_2, 2mol I_2 —[illegible] T [illegible] V→ H_2 x mol, I_2 y mol, HI zmol

[illegible] 2: 2mol H_2, 4mol I_2 —[illegible] T [illegible] V→ H_2 ?, I_2 ?, HI ?

[illegible]

2mol H_2, 4mol I_2 —[illegible] T, [illegible] V→ H_2 x mol, I_2 y mol, HI z mol | H_2 x mol, I_2 y mol, HI z mol —[illegible] P, [illegible]; [illegible]→ H_2 2x mol, I_2 2y mol, HI 2zmol

[illegible]

[illegible]：$2SO_2\ (g) + O_2(g) \rightleftharpoons 2SO_3\ (g)$

$n_{01}(mol)$ 2 1 0

[illegible] ?

[illegible] 1

2mol SO_2
1mol O_2

ol) 4 2

[illegible] T [illegible] V

[illegible]

SO_2 x mol
O_2 y mol
SO_3 zmol

[illegible] 2

4mol SO_2
2mol O_2

[illegible]

SO_2 x mol | SO_2 x mol
O_2 y mol | O_2 y mol
SO_3 zmol | SO_3 zmol

[illegible] P [illegible]

[illegible]

SO_2 <2x mol
O_2 <2y mol
SO_3 >2zmol

(3) [illegible] ([illegible] c [illegible] p [illegible] n [illegible]) [illegible]

[illegible]： $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

n_{01}(mol)	2	1	0
…l)	4	2	

[illegible] 1: 2mol SO_2, 1mol O_2 → [illegible] T [illegible] P → [illegible]: SO_2 x mol, O_2 y mol, SO_3 zmol

[illegible]

[illegible] 2: 4mol SO_2, 2mol O_2 → SO_2 x mol, O_2 y mol, SO_3 zmol | SO_2 x mol, O_2 y mol, SO_3 zmol → SO_2 2x mol, O_2 2y mol, SO_3 2zmol

[illegible]

[illegible] 1 [illegible] $H_2 + I_2 \rightleftharpoons 2HI$

	H_2	I_2	$2HI$
n_{01}(mol)	1	2	0
n_{02}(mol)	2	4	0

$\alpha(H_2)$ [illegible]

[illegible] 2 [illegible] $H_2 + I_2 \rightleftharpoons 2HI$

① 1 mol　　2 mol　　0

② [illegible] H_2 [illegible] $\alpha(H_2)$ [illegible] $\alpha(I_2)$ [illegible]

[illegible]

[illegible] 3 [illegible] $2HI \rightleftharpoons H_2 + I_2$

① 2 mol　　0　　0

② [illegible] HI [illegible] $\alpha(HI)$ [illegible]

□□□

$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

	SO_2	O_2	SO_3
①T,V	2	1	0
②T,V	4	1	0
③T,V	4	2	0
④T,P	2	1	0

(□□ V □①□□)

② □□□①□ α(SO_2) □ ↓ α(O_2) □ ↑

③ □□□①□ α(SO_2) □ ↑ α(O_2) □ ↑

④ □□□①□ α(SO_2) □ ↑ α(O_2) □ ↑

$$N_2O_4 \rightleftharpoons 2NO_2$$

① [illegible] $2mol\ N_2O_4$ [illegible]

[illegible] N_2O_4 [illegible] _____ [illegible] [illegible]（[illegible]“[illegible]”[illegible]“[illegible]

[illegible]”[illegible]“[illegible]”）[illegible] $\alpha(N_2O_4)$ ______（[illegible]“[illegible]”[illegible]“[illegible]”[illegible] [illegible]“[illegible]

[illegible]”）

② [illegible] $2mol\ NO_2$ [illegible]

a. [illegible] ______ [illegible]（[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]

[illegible]”）[illegible]

b. [illegible] ______（[illegible] [illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”）[illegible]

c. [illegible] ______（[illegible]“[illegible]”[illegible]“[illegible]

[illegible]”[illegible]“[illegible]”）

[illegible]

□□□□□□□□□□□□□□□□□□□□□□ aA(g) ⇌bB(g)+
cC(g) □□□□□□□□□□□□□□□□□□□□□□□ A □□□□□□
□□□□□□□□□□□□□□□□□□□□

□1□□ a=b+c □□ A □□□□ ______ (□□□□□□
□□□□□□) □□

□2□□ a>b+c □□ A □□□□ ______ □□

□3□□ a<b+c □□ A □□□□ ______ □□

□□□□

1. □□□□□□□□□2molA□1molB□□□□□□□□
2A(g)+B(g)⇌xC(g) □□□□□□□C□□□□□□W%□
□□□□□□□□□□□□□□□□□□□□□□□
A□0.6mol□B□0.3mol□C□1.4mol□□□□□□□□
□□□C□□□□□□□W%□□x□□□□   □   **C**

A□□□□2

B□□□□3

C□□□□2□□□□□3

D□□□□□

一定温度下，在 3 个体积均为 1.0 L 的恒容密闭容器中发生如下反应，$2H_2(g)+CO(g) \rightleftharpoons CH_3OH(g)$ 达到平衡。下列说法正确的是（　　）

容器	温度/K	物质的起始浓度/mol·L^{-1}			物质的平衡浓度/mol·L^{-1}
		$c(H_2)$	$c(CO)$	$c(CH_3OH)$	$c(CH_3OH)$
Ⅰ	400	0.20	0.10	0	0.080
Ⅱ	400	0.40	0.20	0	
Ⅲ	500	0	0	0.10	0.025

A．该反应的正反应吸热

B．达到平衡时，容器I中反应物转化率比容器II中的大

C．达到平衡时，容器II中 $c(H_2)$大于容器III中 $c(H_2)$的两倍

D．达到平衡时，容器III中的正反应速率比容器I中的大

3. □□□□□□□□□□□□□□□□□□□□□□□□□3LA□2LB□
□□□□□□□

3A□g□+2B□g⇌xC□g□+yD(g)□□□□
□□C□□□□□□m%□□□□□□□□□□□□□
0.6LA □0.4LB□4LC□0.8LD□□□□□□□□□□□□□
□□□□□□□C□□□□□□□m%□□X□Y□□□□□

[ ]

A□x=3 y=1 B□x=4 y=1 CD

C□x=5 y =1 D□x=10 y=2

4. [illegible] ⇌ [illegible] $2SO_2(g)+O_2(g)$ $2SO_3(g)$ [illegible] $\Delta H=-196.6kJ/mol$ [illegible]

[illegible] 3 [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	SO_2 [illegible]	[illegible]	[illegible]
[illegible]	2mol SO_2 1mol O_2	α_1	C_1	[illegible] a kJ	V_1
[illegible]	2mol SO_3	α_2	C_2	[illegible] b kJ	V_2
[illegible]	4mol SO_3	α_3	C_3	[illegible] c kJ	V_3

(1) [illegible] α_2 __=__ α_3 ([illegible]“<”[illegible]“>”[illegible]“=”)

(2) V_1 [illegible] V_2 [illegible] V_3 [illegible] __$2V_1=2V_2=V_3$__

(3) a [illegible] b [illegible] __a+b=196.6__